

DETERMINATION OF TRAINEE TEACHERS CONCEPTUAL FRAMEWORKS ABOUT ENVIRONMENT AND ECOLOGY

C. ALADAG

Department of Geography, Ahmet Kelesoglu Faculty of Education, Necmettin Erbakan University, 42 090 Meram, Konya, Turkey

E-mail: caladag@konya.edu.tr; caner5101@gmail.com

Abstract. The aim of this study is to expose the conceptual frameworks of undergraduates who studied environmental information before about ecology and environment and determine concept misunderstandings by using word association test. The research was appealed on 81 students studying in Necmettin Erbakan University A. K. Educational Faculty Department of Geography and Biology during 2011–2012 spring semester. In this study, it was revealed that the students mostly pointed out environmental pollution in their written statements. Another idea which gained importance secondarily is about practices leading the pollution of environment. Written notions about these two notions are close to each other in percentages. Opinions reminding environmental pollution mainly constitute the main points of students' environment sense.

Keywords: teacher candidates, ecology, environment, perception.

AIMS AND BACKGROUND

Although environment and ecology both have same meaning, ecology also reminds environmental problems alongside environment¹. The fact that ecology and environment notions have to be intensified exceedingly is also clear from the fact that the environment problems we come across increase day by day instead of decreasing. Despite the many studies about this subject around the world and the symposiums held in our country in recent years, we are far away from the desired point about the increase of sensibility towards environment.

In fact, environmental pollution is only a part of the problems heaped up around the concept of 'environmental problems'. As well as pollution, many problems take part in environment, they are related to environment and affects the environment. It can not be asserted that problems like domicile, shack, transportation, green field, etc. are not environmental problems. Besides, it looks like environmental problems are identified with pollution maybe because of broadcasts aiming draw the attention of world opinion².

Spoilages in ecological balance expose all living creatures with various problems. For example, we can not be sure anymore if the weather we breathe, the water we drink, the soil on which the vegetables and fruits we consume grow is healthy

or not. Human existence and activities underlie the environmental problems. The population of world increasing dramatically is one of the main factors underlying environmental problems.

As a result of the consumption of natural resources by humans enormously and by this way, the disturbing of the natural balance, many important problems have occurred. These are called 'Environmental Problems' or 'Ecological Problems of Humanity'. These problems originated economic, ecologic, technologic, sociologic and politic are vitally important³. Environmental education needs to be studied in different levels in primary schools, secondary schools, high schools, and colleges beginning from pre-education science programmes because of its interdisciplinary features⁴. The fact that teachers to teach environmental education should be educated well in university level comes into prominence. Only sensible and conscious teachers can make the students gain required conscious and responsibility about the environment. Besides, in order to increase the effectiveness of the course, instructional approaches which make the students active, rescue them from being slavery of knowledge, improve their brain power become necessary⁵. Reasons like decrease of water resources, eutrophication, medical wastes, and use of fossil fuel lead ravages hard to be recovered in the decomposition of natural balance. Against the worsening of water quality and hydrophilous ecosystem, many countries prepare projects about the protection of natural resources while imposing legal sanction for source water protection⁶. Although the burn of medical wastes smooths away many harmful toxins and contagious substances, it can not totally shatter the heavy metal inside them. This metal and heavy metal pollution survive in bottom ash and fly ash. These ashes have more toxic effect on environment than other kind of ashes even in low concentrations⁷. Because of human reasons, the increase that might happen in greenhouse gas reservoirs and particles, worsening of natural environment, depleting in the ozone layer would lead global temperature rise⁸. Greenhouse gas reservoirs in the atmosphere with burn of fossil fuel, deforestation, land use changes and industrial processes have increased since the industrial revolution. This leads to the increase of surface temperature of the world by strengthening natural greenhouse effect with the contribution of urbanisation⁹.

It is clear that ecology is a branch of science that needs to be more consulted in solving of problems about environment. So, it would be a true approach to describe ecology as resultant of all the values and all the elements that strengthen life and make human life more qualitative. Humanity who had been using natural resources irresponsibly for centuries has been aware of the fact that it cuts its own throat for last centuries. Ecology science researching the relations of natural balance and the creatures in the nature with each other has begun to call the attention of the researchers of all science branches in this process. Besides, the fact that subjects like ecologic approaches, environmental policies and environmental

education gain importance in instruction approaches and policies of the state is a sign of this.

Environmental conscious is aimed to be imposed via environmental education about protection of environment in schools and various activities towards all parts of the society. However, the desired point has not been arrived, yet. So, more has to be done about environmental education. This study has been made in order to determine how traniee teachers are knowledgeable with ecology and environment and what kind of conceptual misunderstandings they have. Moreover, it also aims to reveal the size of knowledge the traniee teachers acquired during their education and what kind of studies can be done to overcome their deficiencies if they have.

EXPERIMENTAL

Research model. In this study, word association test was used. Word association is a method designed to reveal the relations people constitute towards notions. It is a technique that is used to analyse the students cognitive structure and inter-conceptual relations in this structure, in other words knowledge web, and to determine if the interconceptual relations in long-term memory are sufficient or meaningful.

Particularly in recent years, the effect of constructivist learning approach on education and the deficiency of traditional assessment and evaluation techniques in describing conceptual understanding caused to discover different techniques and strategies of assessment and evaluation. Researchers have gravitated to techniques assessing not only the knowledge the students own, but also their relations between different knowledge and notions, their cognitive structures, if they acquire meaningful learning by relating new knowledge with existing knowledge or not, in which level they understand the similarities between the knowledge they constitute in their minds and the process of the events in real and natural world in the extent of science. Besides, techniques should reveal the cognitive structures of the students, the relations between notions in this structure and should help us determine if relations between notions are sufficient or not have gained importance¹⁰.

Study group. The students of Necmettin Erbakan University A. K. Education Faculty Department of Biology and Geography constituted the work group. Total of 81 students applied WAT (word association test). The common trait of the students applying the test is that they were selected from classes having environmental education course.

Gathering and analysing data. First of all, the students to be applied in the test were informed about the test and their understanding the event was secured via an example. In later stage, the students were asked to write 10 notions about ecology and environment which come to their minds in 30 s. While some of the students

could not write 10 notions in that time, most of them completed. The amount of written notion was accounted as 655 and the ones that the students stated with different statements but similar in view of content were tried to be gathered in same category by the researcher. In next stage, the written notions were classified properly like pollutants, pollution, practices causing pollution. Later, frequency distribution of these data was made by analysing and their percentage ratios were calculated.

RESULTS

Findings obtained after the analysis of data are summarised in Tables 1–5.

Table 1. Notions about the pollutants causing environmental pollution

Notions	Frequency	
Industry, chimney stacks, stove	46	
Carbon dioxide	21	
Carbon monoxide	15	
Greenhouse gases	9	
Sulphur dioxide, sulphur oxide	6	
Nitrogen	6	
Nitrous oxides	5	
Coal gas	5	
CFC, perfume	3	
Noble gases (helium, krypton, etc.)	2	
Sulphuric acid	2	
Cyanide	1	
Lead	1	
Total	122	grand total 655

On analysing the notions classified in this category (Table 1), it is seen that industry and use of coal or stove are mostly mentioned as pollutant sources. It also comes up that the other ones in high number as frequencies are in fact efficient pollutant in the pollution of atmosphere. The fact that pollutants causing the pollution of water or soil do not come to mind firstly draw attention.

Table 2. Notions related to environmental pollution

Notions	Frequency	
Water pollution (stream, lake, sea)	54	
Air pollution	52	
Fossil fuels	39	
Soil pollution	31	
Exhaust gases	21	
Acid rains	13	
Visual pollution	10	
Noise pollution	10	
Nuclear pollution (powerhouse, waste)	4	
Temperature inversion	1	
Light pollution	1	
Total	236	grand total 655

On examining the notions in this category (Table 2), it can be seen that both notions related to pollution were written excessively in ratio, and subjects like air, soil and water pollution were stated intensely. Among the written notions, those stating environmental pollution have huge amount in percentage. Features like nuclear pollution and light pollution rationally stated low.

Table 3. Notions related to practices causing environmental pollution

Notions	Frequency	
Wastes and garbage (domestic, industrial)	76	
Urbanisation and population increase	21	
Pesticides and toxic substances	14	
Eutrophication	11	
Unconscious consumption, lack of supervision, attitude of country	9	
Particulates	9	
Pong, sewer	8	
Unplanned urbanisation	6	
Over-fertilisation	4	
Radiation	3	
USA	1	
Dam	1	
Pieces of glass	1	
Warfare	1	
Oil tanker accidents	1	
Dust	1	
Lack of faith	1	
Food with GMO (genetically modified organism)	1	
Herbicide	1	
Total	170	grand total 655

On viewing the category of practices causing environmental pollution (Table 3), wastes and garbage notably higher than other notions draw attention. Secondly, the perception about urbanisation and population increase causing environmental problems occur. Pesticides, eutrophication, unconscious consumption and unplanned urbanisation also have important contribution, although they are in less rate than the first two (wastes/garbage and urbanisation/population increase).

Table 4. Notions about the results of environmental pollution

Notions	Frequency
Health problems, poisoning, deaths (respiratory tract diseases, cancer, etc.)	25
Death of creatures, vanishing genres	21
Habitat fragmentation, demolition of vegetation	10
Ozone depletion	7
Global warming	7
Narrowing of living spaces of creatures	5
Anoxia	3
Infertility	1
Desertification	1
Erosion	1
Total	81 grand total 655

The biggest share among the notions about the results that environmental pollution would cause (Table 4) belongs to health problems and death of creatures. Ideas like ozone depletion, global warming and anoxia came after this idea. Results like desertification, erosion and infertility were stated each only one time.

Table 5. Notions related to protection of environment

Notions	Frequency
Ecology and ecosystem	14
Filtration	6
Environment courses, conferences, education	5
Purifying, purge	5
Vitiation via recycling	4
Greenpeace	3
Tema	3
The Kyoto Protocol	2
Activity, protestation	2
Greenpeace	1
Future	1
Total	46 grand total 655

Among the ideas regarding the protection of environment (Table 5), the protection of ecosystem was mostly emphasised. Other statements intensely mentioned are filtration, environment education and recycling systems. Despite having little share, exercises like Greenpeace, the Kyoto Protocol, protestation were stated.

CONCLUSIONS AND DISCUSSION

When we look at the ideas that pre-service teachers expressed, the striking result is that concepts of pollution and pollutants are the first that come to mind. However, it might be more appropriate that the prevention of pollution and the imagination of a cleaner environment were first ideas that come to mind. The fact that environment is being polluted continually has a great role in the fact that concepts related to pollution are the ones that come to mind first when mentioned about environment. In fact, it is obvious that studies must be done due to displacement of these ideas of teachers who will train the future generations. For the formation of the perception of a more livable environment among younger generations, it is observed that some kinds of new regulations are needed. It is also seen that concepts have been sometimes incorrectly perceived or some subjects have not been fully apprehended among students. However, this does not have a share of more than as a ratio, and today it is the general overview is that the environmental pollution is further size. In a comparative study that made for the students of eight class¹¹, it has been concluded that eco-school students who have taken part in some activities on environmental education have gained more awareness than the other students.

In his research¹², Aydin has reached to the conclusion that geography teacher candidates are aware of the importance of environmental education and environmental problems in our country and around the world, and they think that environmental education should be started in the level of pre- school.

Senyurt et al.¹³ in their research, which they made in order to determine the socio-demographic factors that affect the university students attitudes towards environmental issues, have determined that gender, the department students study and whether they took lessons on environment before cause to difference. In addition, they have emphasised that there are significant differences in relation to their mothers education level and their family income level and that it is needed the the university students awareness of environmental challenges should be increased.

In another study conducted by researchers, primary 6,7, and 8 grade students awareness for environmental issues, prior knowledge and sensitivity to the environment have been tried to be measured. As a result, it has been observed that students are aware of the environmental problems that caused by environmental pollution, air pollution and waste in the main¹⁴. They have reached to the conclusion that there are misconceptions on the subjects such as greenhouse effect and global warming, causes of which ignored, on the stage of education¹⁵.

It is seen that there are similarities between the findings of the research and the findings of the number of previous studies have been done before^{14,16,17}. It is noteworthy that especially a number of misconceptions continue. The concept of environmental pollution that comes to mind first when we speak about environment, is a common feature in almost all studies. The perception of a clean environment emerges only when the idea that pollution must be prevented comes to mind. It is obvious that before pollute the environment it is necessary to create awareness to keep environment clean and all kinds of steps such as education – training, activities intended to train individuals who are environmentally sensitive should be priority.

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